

Chemical Compounds

| | Ionic Compounds | Covalent (Molecular) Compounds |
|--------------------|--|--|
| Description | <ul style="list-style-type: none"> Atoms are bonded by transferring electrons during ionization. A metal cation transfers electrons to a non-metal anion. | <ul style="list-style-type: none"> Atoms are bonded by sharing valence electrons Non-metal atoms share electrons. |
| Naming | <ul style="list-style-type: none"> Name of cation is written first, followed by name of anion. If the cation is a multivalent metal (more than one possible ion charge), the ion charge is written in brackets in Roman numerals The anion is given the suffix “ide”, unless it is a polyatomic ion. Polyatomic ions use their specific name, and receive no other suffixes <p>Examples Sodium chloride Magnesium chloride Iron (II) nitride Potassium carbonate</p> | <ul style="list-style-type: none"> The order of the name depends on the group (column) of each element, with the exception of hydrogen (lower group # = first name) Prefixes are attached to each element’s name to indicate the number of each element that is used in the compound The only time a prefix is not used is if there is only one atom of the first element. Prefixes are always used for the second element, even if there is only one atom. The suffix “ide” is used for the second element. <p>Examples Dinitrogen tetroxide Bromine monochloride Disulfur dinitride Dihydrogen monoxide</p> |
| Formula | <ul style="list-style-type: none"> The symbol for the cation is first, followed by the symbol for the anion Subscripts to the right of each symbol indicate how many atoms of each element are included in the compound The ratio of elements can be reduced to the lowest equivalent ratio The ion charge of each element determines the subscript of the other element. This gives a total charge of 0. <p>Examples NaCl MgCl₂ Fe₃N₂ K₂CO₃</p> | <ul style="list-style-type: none"> The symbols for each element is written in the same order as they appear in the name The prefixes determine what subscripts are written to the right of each symbol We do not reduce the ratio of atoms in a molecular compound <p>Examples N₂O₄ BrCl S₂N₃ H₂O</p> |

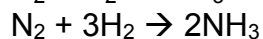
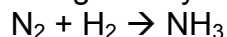
Balancing Chemical Equations

- Write the word equation first
- Write the skeleton equation, which includes the proper symbols and subscripts
- Add coefficients in front of the elements and compounds to balance the equation. **DO NOT CHANGE ANY SUBSCRIPTS!**

Example

Ammonia is the product of a reaction between nitrogen and hydrogen. Write a balanced chemical equation for this reaction.

nitrogen + hydrogen \rightarrow ammonia



Chemical Reactions

| Type of Reaction | General Equation | Examples |
|-------------------------------------|--|--|
| Synthesis Reaction | $A + B \rightarrow AB$ | Sodium chloride is the produce of a synthesis reaction. $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$ |
| Decomposition Reaction | $AB \rightarrow B + A$ | Water is separated into hydrogen gas and oxygen gas through electrolysis. $2\text{H}_2\text{O}_2(\text{l}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$ |
| Single Displacement Reaction | Metals: $A + \text{BC} \rightarrow \text{B} + \text{AC}$ Non-metals: $A + \text{BC} \rightarrow \text{C} + \text{BA}$ | $\text{Al}(\text{s}) + \text{NiBr}_3(\text{aq}) \rightarrow \text{Ni}(\text{s}) + \text{AlBr}_3(\text{aq})$ $\text{F}_2(\text{g}) + 2\text{NaI}(\text{s}) \rightarrow \text{I}_2(\text{s}) + 2\text{NaF}(\text{s})$ |
| Double Displacement Reaction | $AB + \text{CD} \rightarrow \text{AD} + \text{CB}$ | $\text{NaCl}(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{NaNO}_3(\text{aq}) + \text{AgCl}(\text{s})$ |